

IN THE CLAIMS:

Please amend claims 1-3, 5-7, 9-11, 13-17, and 19-32 as shown below.

Sub 1

1. (Currently Amended) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:
an operand processing section operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result comprised of a mantissa and an exponent; and
an operand flush section coupled to the operand processing section and operative to
determine whether the preliminary result falls within one of a plurality of ranges of values between zero and a minimum normalized floating-point number, a_{min} , and
set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges of values.

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2. (Currently Amended) The FPU of claim 1, wherein the operand flush section is operative to set the preliminary result to one of two set values if it falls within one of two ranges of values between zero and the minimum normalized floating-point number, a_{min} .


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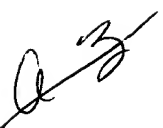

3. (Currently Amended) ~~The FPU of claim 2,~~
A floating-point unit (FPU) configurable to perform floating-point operations, comprising:
an operand processing section operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result;
and
an operand flush section coupled to the operand processing section and operative to
determine whether the preliminary result falls within a first or second ranges of values, wherein a the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, or 0

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 $y < a_{\min}/2$, and wherein a the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number, or $a_{\min}/2 \leq y < a_{\min}$, and set the preliminary result to a first or second set value if the preliminary result falls within the first or second range of values, respectively.


4. (Original) The FPU of claim 3, wherein the preliminary result is set to zero if it falls within the first range of values and to the minimum normalized floating-point number, a_{\min} , if it falls within the second range of values.


5. (Currently Amended) The FPU of claim 1, wherein the plurality of ranges are selected such that a determination of whether the preliminary result falls within one of the plurality of ranges of values can be performed by checking ~~an~~ the exponent of the preliminary result. 


6. (Currently Amended) The FPU of claim 1, wherein the plurality of ranges are defined by ~~a set of~~ one or more threshold values that are related by factors of two. 

7. (Currently Amended) The FPU of claim 1, wherein the operand flush section is operative to check a minimum number of most significant bits (MSBs) of the exponent of the preliminary result to determine whether the preliminary result falls within the plurality of ranges of values, and wherein the minimum number of MSBs is determined by the plurality of ranges of values

~~wherein the plurality of ranges cover denormalized floating-point numbers between zero and a minimum normalized floating-point number, a_{\min} .~~

8. (Original) The FPU of claim 1, and operable to perform a reciprocal operation. 

9. (Currently Amended) A floating-point unit (FPU) configurable to perform floating-point operations, comprising: 

Sub B1

operation,

a mantissa processing section operative to, for each floating-point

receive and process one or more mantissas for one or more input

operands to provide a preliminary result mantissa,

set the preliminary result mantissa to a first mantissa value if a

result of a floating-point operation, comprised of a mantissa and an exponent, is

within a first range of values between zero and a minimum normalized floating-

point number, a_{min} , and

set the preliminary result mantissa to a second mantissa value if the

result is within a second range of values between zero and the minimum

normalized floating-point number; and

an exponent processing section coupled to the mantissa processing unit

and operative to

receive and process one or more exponents for the one or more

input operands to provide a preliminary result exponent,

set the preliminary result exponent to a first exponent value if the

result is within the first range of values, and

set the preliminary result exponent to a second exponent value if

the result is within the second range of values.

03

10. (Currently Amended) The FPU of claim 9, wherein

the first range of values includes values greater than zero and less than a

first threshold value defined as half of a the minimum normalized floating-point number,

or $0 < y < a_{min}/2$, and

the second range of values includes values equal to or greater than the first

threshold value and less than a ~~second threshold value defined as~~ the minimum

normalized floating-point number, or $a_{min}/2 \leq y < a_{min}$.

11. (Currently Amended) The FPU of claim 9, wherein ~~combination of~~

the first mantissa value and the first exponent value represent ~~values represents~~ zero, and

wherein ~~the~~ combination of the second mantissa value and the second exponent value

represent ~~values represents~~ the minimum normalized floating-point number, a_{min} .

Sub B1

12. (Original) The FPU of claim 9, wherein a determination of whether the result is within the first or second range of values is performed by checking the preliminary result exponent.

13. (Currently Amended) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:

a mantissa processing section operative to, for each floating-point operation,

receive and process one or more mantissas for one or more input operands to provide a preliminary result mantissa, and

set the preliminary result mantissa to one of a plurality of possible mantissa set values if a result of a floating-point operation, comprised of a mantissa and an exponent, falls within one of a plurality of ranges of values between zero and a minimum normalized floating-point number, a_{min} ; and

A3

an exponent processing section coupled to the mantissa processing unit and operative to

receive and process one or more exponents for the one or more input operands to provide a preliminary result exponent, and

set the preliminary result exponent to one of a plurality of possible exponent set values if the result falls within one of the plurality of ranges of values.

14. (Currently Amended) The FPU of claim 13, wherein the preliminary result mantissa and the preliminary result exponent are each set to one of two possible set values depending on whether the result falls within one of two ranges of values between zero and the minimum normalized floating-point number.

15. (Currently Amended) The FPU of claim 13, wherein the plurality of ranges of values are selected such that a determination on whether the result falls within one of the plurality of ranges of values can be made by checking the preliminary result exponent against one or more exponent comparison values.

16. (Currently Amended) A floating-point unit (FPU) configurable to perform arithmetic operations, comprising:

an exponent processing unit operative to receive and process one or more exponents for one or more input operands for each arithmetic operation to provide a preliminary result exponent partially indicative of a result of an arithmetic operation;

and

an exponent flush unit coupled to the exponent processing unit, the exponent flush unit operative to

receive and compare the preliminary result exponent to at least one exponent comparison value greater than zero and less than an exponent value, E_{\min} , for a minimum normalized floating-point number, and

set the preliminary result exponent to one of a set of possible plurality of exponent set values based on results of the comparison between the preliminary result exponent and the at least one exponent comparison value.

17. (Currently Amended) ~~The FPU of claim 16, wherein the preliminary result exponent is compared to one~~

A floating-point unit (FPU) configurable to perform arithmetic operations, comprising:

an exponent processing unit operative to receive and process one or more exponents for one or more input operands for each arithmetic operation to provide a preliminary result exponent partially indicative of a result of an arithmetic operation; and

an exponent flush unit coupled to the exponent processing unit and operative to

receive and compare the preliminary result exponent to an exponent comparison value, $E_{\min} - 1$, that is equal to one less than an exponent value, E_{\min} , for a minimum normalized floating-point number, and

set the preliminary result exponent to one of a plurality of exponent set values based on results of the comparison between the preliminary result exponent and the exponent comparison value.

18. (Original) The FPU of claim 17, wherein the preliminary result exponent is set to E_{\min} if it is equal to the exponent comparison value of $E_{\min} - 1$.

19. (Currently Amended) The FPU of claim 17, wherein the preliminary result exponent is set to an exponent value for a floating-point zero if it is less than the exponent comparison value of $E_{\min} - 1$.

20. (Currently Amended) A floating-point processor comprising:
a memory unit operative to store instructions;
an instruction dispatch unit operative to retrieve instructions from the memory unit; and
a floating-point unit (FPU) coupled to the instruction dispatch unit and operative to perform a floating-point operation on one or more input operands to provide a preliminary result comprised of a mantissa and an exponent, wherein the preliminary result is flushed to zero if it falls within a first range of values and set to a set value if it falls within a second range of values, wherein the first and second ranges of values are between zero and a minimum normalized floating-point number, a_{\min} .

21. (Currently Amended) ~~The floating-point processor of claim 20;~~
A floating-point processor comprising:
a memory unit operative to store instructions;
an instruction dispatch unit operative to retrieve instructions from the memory unit; and
a floating-point unit (FPU) coupled to the instruction dispatch unit and operative to perform a floating-point operation on one or more input operands to provide a preliminary result, wherein the preliminary result is flushed to zero if it falls within a first range of values and set to a set value if it falls within a second range of values,
wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, or $0 < y < a_{\min}/2$, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number, or $a_{\min}/2 \leq y < a_{\min}$.

Sub B1

22. (Currently Amended) The floating-point processor of claim 20, wherein a determination on whether the preliminary result falls within the first or second range of values is made by checking ~~an~~ the exponent of the preliminary result.

23. (Currently Amended) A method for performing a floating-point operation, comprising:
receiving one or more input operands for the floating-point operation;
processing the one or more received operands to provide a preliminary result comprised of a mantissa and an exponent;
determining whether the preliminary result is within a first or second range of values between zero and a minimum normalized floating-point number, a_{min} ;
setting the preliminary result to a first value if it is within the first range of values; and
setting the preliminary result to a second value if it is within the second range of values.

A3

24. (Currently Amended) The method of claim 23, further comprising:
checking ~~an~~ the exponent of the preliminary result to determine whether the preliminary result falls within the first or second range of values.

25. (Currently Amended) The method of claim 23, wherein the first value is zero and the second value is a the minimum normalized floating-point number.

26. (Currently Amended) ~~The method of claim 23,~~
A method for performing a floating-point operation, comprising:
receiving one or more input operands for the floating-point operation;
processing the one or more received operands to provide a preliminary
result;
determining whether the preliminary result is within a first or second range
of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number;

Amended B1

setting the preliminary result to a first value if it is within the first range of values; and
setting the preliminary result to a second value if it is within the second range of values.

27. (Currently Amended) A computer program product for performing a floating-point operation, comprising:

code that directs reception of one or more input operands for the floating-point operation;

code that processes the one or more received operands to provide a preliminary result comprised of a mantissa and an exponent;

code that determines whether the preliminary result is within a first or second range of values between zero and a minimum normalized floating-point number, a_{min} ;

code that sets the preliminary result to a first value if it is within the first range of values;

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code that sets the preliminary result to a second value if it is within the second range of values; and

a data storage medium operative to store the codes.

28. (Currently Amended) The computer program product of claim 27, further comprising:

code that checks ~~an~~ the exponent of the preliminary result to determine whether the preliminary result falls within the first or second range of values.

29. (Currently Amended) ~~The computer program product of claim 27,~~
A computer program product for performing a floating-point operation,
comprising:

code that directs reception of one or more input operands for the floating-point operation;

code that processes the one or more received operands to provide a preliminary result;

Sub B1

code that determines whether the preliminary result is within a first or second range of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number, the first value is zero, and the second value is the minimum normalized floating-point number;

code that sets the preliminary result to zero if it is within the first range of values;

code that sets the preliminary result to the minimum normalized floating-point number if it is within the second range of values; and
a data storage medium operative to store the codes.

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30. (Currently Amended) An article of manufacture comprising:
computer-readable program code that causes a computer to describe an operand processing section, wherein the operand processing section is operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result comprised of a mantissa and an exponent;

computer-readable program code that causes a computer to describe an operand flush section, wherein the operand flush section is coupled to the operand processing section and operative to determine whether the preliminary result falls within one of a plurality of ranges of values between zero and a minimum normalized floating-point number, a_{min} , and to set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges; and


a computer-usable medium configured to store the computer-readable program codes.

31. (Currently Amended) An article of manufacture comprising:
computer-readable program code that causes a computer to describe a memory unit, wherein the memory unit is operative to store instructions;

computer-readable program code that causes a computer to describe an instruction dispatch unit, wherein the instruction dispatch unit is operative to retrieve instructions from the memory unit;

 computer-readable program code that causes a computer to describe a floating-point unit (FPU), wherein the FPU couples to the instruction dispatch unit and is operative to perform a floating-point operation on one or more input operands to provide a preliminary result comprised of a mantissa and an exponent, wherein the preliminary result is flushed to zero if it falls within a first range of values and set to a set value if it falls within a second range of values, wherein the first and second ranges of values are between zero and a minimum normalized floating-point number, a_{min} ; and

a computer-usable medium configured to store the computer-readable program codes.

 32. (Currently Amended) A computer data signal embodied in a transmission medium comprising:

computer-readable program code that causes a computer to describe an operand processing section, wherein the operand processing section is operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result comprised of a mantissa and an exponent; and

computer-readable program code that causes a computer to describe an operand flush section, wherein the operand flush section is coupled to the operand processing section and operative to determine whether the preliminary result falls within one of a plurality of ranges of values between zero and a minimum normalized floating-point number, a_{min} , and to set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges.
